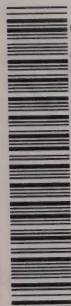


# *Energy for the Future*

Planning Today  
for the Electricity  
We'll Need Tomorrow

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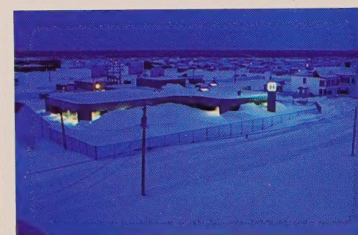
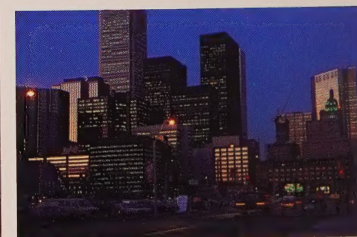
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**Energy for the Future**

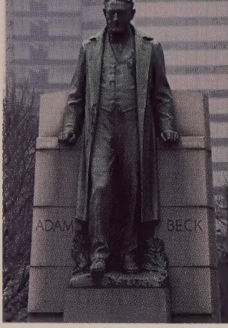
*Planning Today  
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### **Ontario Hydro: Power for a Province and its People**

At the turn of the century, many people in Ontario couldn't get electricity easily. Private companies provided some service, but it was expensive and unreliable. Ontarians were paying more and more to import millions of tons of Pennsylvania coal to generate electricity.

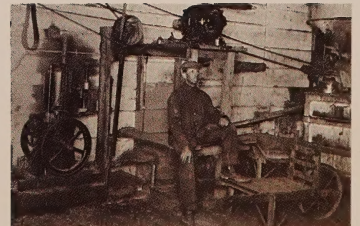
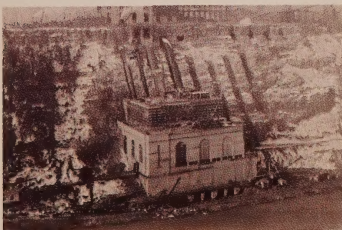
In 1906, Ontario Hydro was created to meet the demand for reliable, affordable electricity. And for more than three-quarters of a century, Ontario Hydro has supplied the people of the Province with electrical energy when and where they need it.

We furnish electric power to municipal utilities at cost who then sell it to individual homes and businesses. Ontario Hydro also delivers power directly to over 100 large industries and nearly three-quarters of a million customers in rural areas. Together with the municipal utilities, Ontario Hydro serves more than three million customers – nine million people – across the Province.

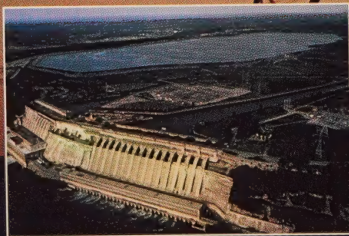
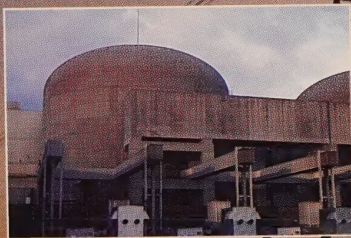
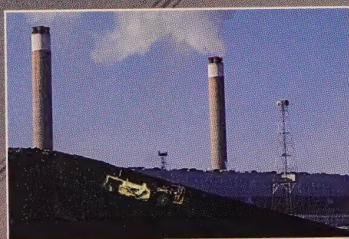
**Below: During the 1920s and 1930s, inexpensive hydro-electric power made electric appliances and other labour-saving devices available to everyone.**

**Bottom: The Sir Adam Beck I Generating Station, completed in 1921.**

**Right: Electricity on the farm helped release the farm worker from the drudgery of hand labour.**











## Where Does My Electricity Come From?

Ontario Hydro operates 80 stations that generate electrical power. We also maintain and operate more than 100,000 kilometres of power lines that carry electricity throughout Ontario.

This electricity is generated by three main sources: hydraulic power from falling water, thermal power from coal, and nuclear power from uranium. At present, each of these sources accounts for about one-third of the energy we produce.

We also buy power from neighbouring utilities in other provinces and the United States. We do this during emergencies, or when it is available at a low cost. Other utilities buy from us on the same basis.

## Which Kind of Generating Station is Best?

Each source has different benefits.

**Fossil-fuelled** stations, such as coal-fired generators, are relatively cheap to build, but we have to import the coal to run them which makes their

power expensive. They're also one of the sources of acid gas emissions that cause acid rain and damage our environment.

**Hydro-electric** facilities, such as our Adam Beck plants in the Niagara Falls region, are relatively cheap to run, but they cost a lot to build. What's more, climate, geographical location and size can limit their contribution to future energy needs.

**Nuclear-powered** stations are also expensive to build, but comparatively cheap to operate. We can get the fuel to run them right in Ontario. And we've got lots of it... enough to last for many hundreds of years.

## Power for the Future: How Much is Enough?

There's one big problem with electricity: you can't store it until it's needed. We have to plan our system today so it can always meet peak demand tomorrow. The Province can't afford to get caught short.

It's just like building a major highway: we need a system that can handle the heaviest use it's likely to get. We have to be able to provide *all* the power that's needed, *when* it's needed. And that includes the darkest and coldest and busiest day of the year.

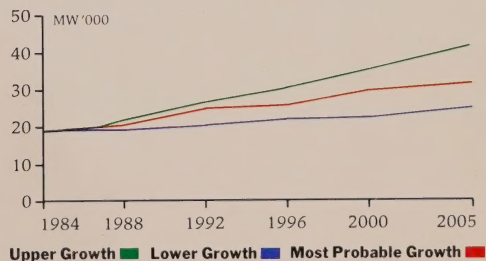
Above: This training simulator duplicates the computers and high-speed electronics found in nuclear station control rooms.

Top left: The coal pile at Nanticoke generating station, 21 kilometres from Port Dover. To reduce environmental effects, the station blends low-sulphur western Canadian coal with coal imported from the U.S.

Centre left: One of the eight units at the Pickering nuclear generating station. When completed in 1986, this station will have the capacity of over 4,000 megawatts, enough to serve the electricity needs of Metropolitan Toronto.

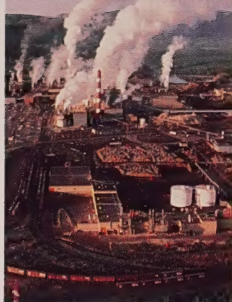
Lower left: The Sir Adam Beck I and II hydraulic generating stations downstream from Niagara Falls. Ontario Hydro now operates 68 hydraulic stations, and is looking at three more developments in the 1990s.

Forecast Electricity Demand



Planning must be able to accommodate higher or lower growth than anticipated. Difference between low and high over 20 years is 13,000 megawatts – 6 times the output from Canadian side of Niagara Falls.





## Don't We Have A Surplus of Electricity Right Now?

Yes, we do. But we can't take any chances when it comes to keeping everyone plugged in. There must be reserves for emergencies.

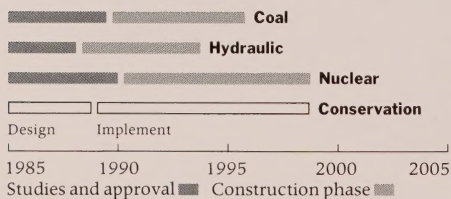
Our major nuclear and hydraulic generating stations run four hours out of every five, year-round. But even the best plants need maintenance and repair from time to time.

And then there are the emergencies that no one can predict: storms can knock down power lines, and we sometimes have to take power from one part of our system while another is being repaired. Spare capacity for maintenance and repair is called "reserve margin," something all electrical utilities must have.

Right now in Ontario, surplus electricity is available, even beyond the reserve margin. But most of this extra power comes from older or less economical generating stations.

It's good to have this potential for emergencies, but if we had to call on this extra and expensive power often, we might be better off looking at other options.

### Lead Times to Meet Energy Needs



Meeting increasing needs for electricity takes years to plan and implement.

## How Much Power Will Ontario Need for the Future?

The only really safe answer to that question is, "More than we have now."

It's very difficult to predict exactly how much power will be needed over the next ten or twenty years. We know that demand will increase, but we don't know how much.

Our working assumption is that electricity demand will grow by a moderate 2.6 per cent each year between now and the year 2005.

That would mean we'd have to find about 6,000 megawatts of new electricity in the next two decades ... or three times the amount of power generated by the Niagara River.

On the basis of that forecast, we'll be certain of meeting the demand only until about 1998. If we do nothing about it, we could start facing energy shortages.

## Does That Mean We're in Trouble?

No. But it does mean that we can't afford to lose any time. Hydro must plan now if we're to live up to our commitment to reliable power at affordable prices.

One of the solutions to this challenge is for Ontario Hydro to find better ways of using our existing system of generating stations and transmission lines.

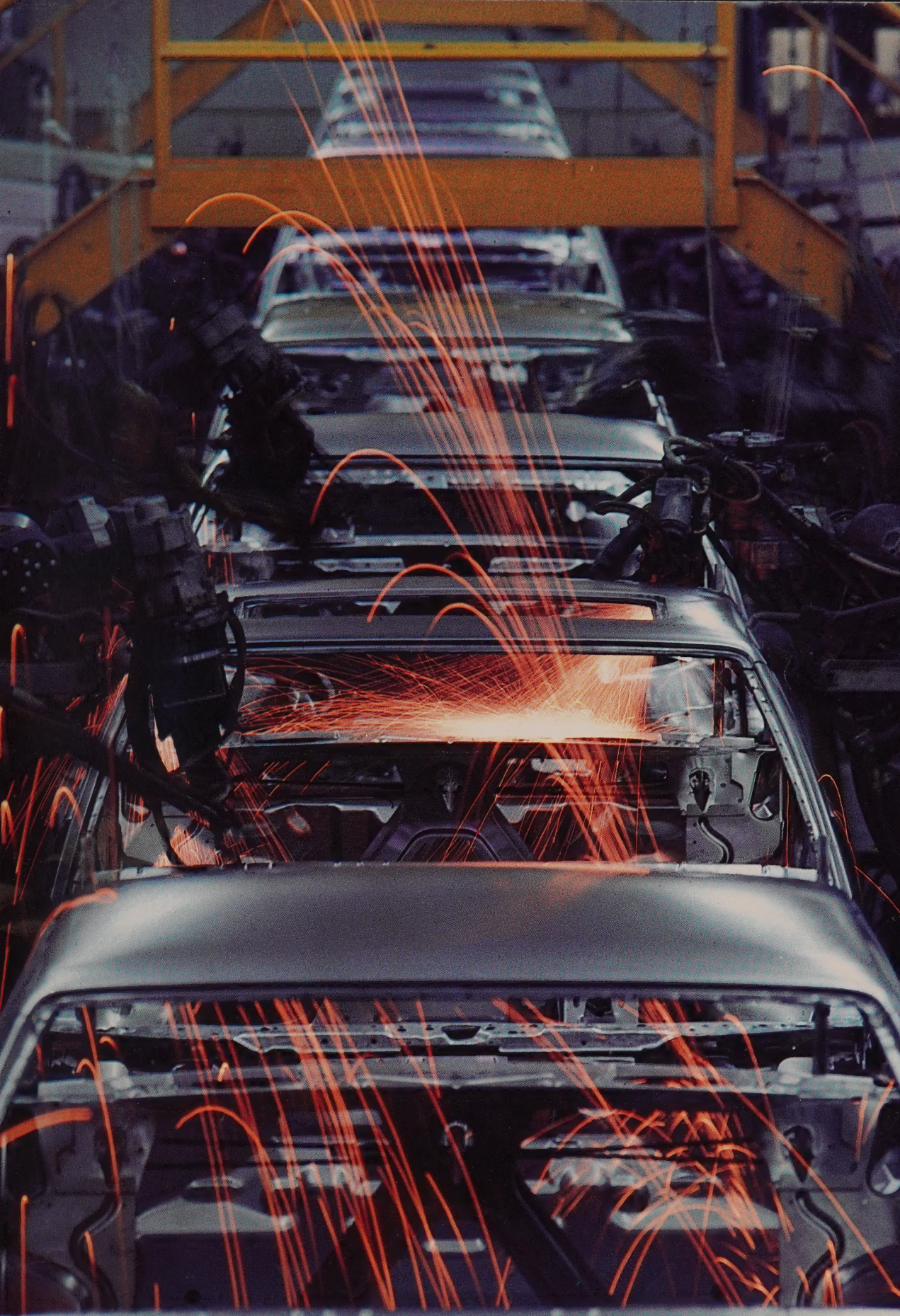
For example, we're working to extend the service life of our existing generating stations. In some cases, the extra expense in repairs and maintenance might be less than the cost of building new stations.

But in the long run, we'll still have to find new sources of power for Ontario.

**Above:** The introduction of thermal-mechanical pulping will use electricity to help make Ontario's pulp and paper industry more efficient.

**Right:** Ontario's growing automotive industry will need electricity to power robots on the assembly line.

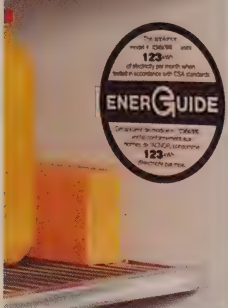












### What Are the Choices?

We have three main choices for getting more electricity: control its use, generate it ourselves, or buy it from someone else. We believe the answer to ensuring our energy future will be a combination of all three.

**Conservation** is one good possibility. If we can get better use out of the electricity we already have, we won't need to increase our system as much or as quickly. That's why Hydro is promoting conservation programs that encourage customers to make a wiser use of the power that's already available.

We've begun a five-year experiment to see if people will agree to use power – for dishwashers, clothes dryers and other major appliances – at off-peak times in return for a reduction in their bill. Response so far has been good.

People can also help save energy by replacing inefficient appliances and insulating their homes and businesses better to reduce energy consumption. But even more can be done to help conservation make a bigger contribution to meeting future energy demand. We might find that it makes sense to offer customers financial help to save energy instead of spending more money for a new generating station.

In fact, it may be possible through energy conservation alone to save enough electricity to meet the needs of a city the size of Hamilton.

### Why Can't You Just Buy the Power You Need from Someone Else?

We do buy power from others. But this option can't meet all of our future energy needs by itself.

First, to import additional large amounts of power from Manitoba and Quebec into Ontario, we'd need more transmission lines. And getting approval to build them takes time.

Then there's the cost. Other utilities naturally want to sell their power for the highest price they can get. That's not necessarily the most economical option for Ontario.

Finally, there's the question of energy independence, being able to meet our own needs ourselves. Even if the price of power from elsewhere is right, we'd need some pretty strong guarantees that it would be available over a long period.

**Above:** Since the introduction of the Energuide program, the overall efficiency of refrigerators has increased by 30 per cent.

**Right:** More effective home insulation can help both homeowners and their utility. It will cut down on energy bills, and by reducing demand, it can help reduce the need to build more facilities.

**Left:** Using electricity during off-peak periods instead of during busy times of the day is another way of reducing the need to build more generating stations.











### **Why Can't You Just Build New Generating Stations?**

We can, but not quickly. In fact, deciding on a location, getting the approval to begin, designing the plant, and building it can take ten years or more.

That's a long time, but it's a very complicated job. We have to look at new facilities with three technical questions in mind: What kind of station should we build? How big should it be? And where should we build it?

But there are more than just technical questions. We also have to consider the effects of new generating stations on the environment ... in social as well as physical terms. And no single possibility meets all of these requirements by itself.

In the past, we've relied on three sources for electricity. Each of them has advantages as well as limitations.

**Hydraulic power** has served us well since 1906, and this form of power is provided naturally. But we're running out of large potential sites where the water falls far or fast enough to provide significant amounts of economical power.

There's also the complication of geographical location. Most of the most promising hydraulic sites are far away from the towns and cities that will need electricity. And the largest ones in the North are located in places where the environment is particularly fragile.

We've recently identified three places where we could build new stations between 1993 and 1997. But it's clear that we'll need more electricity than hydraulic power alone can provide in Ontario.

**Coal's** potential is very high. We could build enough new coal-fired generating stations to meet a good portion of our energy needs for the next two decades.

Unfortunately, coal is expensive and we have to import it from out of the Province. And it's still a source of pollution. By installing equipment such as emission controls and through our program of testing other possibilities we are making coal a cleaner fuel. But so far this new technology can only limit the damage to the environment rather than remove it.

**Nuclear power** has been a part of Ontario Hydro for more than 20 years, and it's provided millions of Canadians with electricity to light their homes and run their businesses.

It's true that nuclear power stations are expensive to build, but once they're in place, they're fairly cheap to run ... mainly because the uranium that fuels them is such a small part of their operating cost.

Nuclear stations are most cost-effective when designed as large multiple-unit additions to the system. In an environment where future load growth is difficult to forecast, planning new nuclear stations may not be as flexible as other options.

Above: Completing the vacuum building at the Darlington nuclear generating station. The use of a large building kept at lower than atmospheric pressure is a safety feature unique to the CANDU design.

Left: The Attawapiskat River near James Bay. Constructing dams on the muskeg and permafrost poses major environmental problems.









### What About Other Energy Sources?

Hydro is considering several alternative sources of energy to supplement more traditional ways of producing electricity.

At Chapleau, in Northern Ontario, we've signed an agreement with a local industry to buy electricity produced from waste wood in lumbering operations. This option, **co-generation**, makes two forms of energy—usually steam and electricity—from one fuel. There may be other such possibilities for producing small but significant amounts of future energy.

The garbage we throw out is not a high-grade fuel, but it can be burned to produce electricity. This option, **municipal solid waste**, may prove that it's more economical to burn our trash for energy than paying more and more to dispose of it in other ways.

The sun represents an almost inexhaustible source of energy, but it's still difficult to convert it to electricity in an economical way. Nevertheless, **solar power** could prove useful as one source of energy, particularly in remote northern communities where it may prove cheaper than the diesel fuel that currently powers many generators.

Hydro has been studying solar power for some time, and we'll continue to track new developments to see how this kind of energy might help us meet new demands.

**Wind energy** is another possible contributor, though most of Ontario doesn't have strong, steady enough winds for this to be a big part of our energy future. Even so, we're co-operating in a test on a wind generator in Fort Severn, Ontario's most northerly settlement.

And there's always the possibility that new advances in science and technology might offer new choices. Hydro is already studying a wide variety of potential technologies to see how and if they can help keep Ontario's energy needs satisfied.

Right: A cogeneration project in Chapleau will produce steam and electricity from waste wood products.

Left: New developments in wind turbine design have made wind power useful in those parts of the world with high average windspeeds and high electricity rates. Wind energy may prove useful in some remote northern communities.

Top left: These photovoltaic solar panels are being tested at the Kortwright Conservation Centre northwest of Toronto.

Lower left: A municipal solid waste plant in Hamilton. There is energy potential in the garbage we throw out.







### Is There a "Best" Option?

No. We don't have one single option that can meet all of our energy needs for the next 20 years . . . and beyond. Each of our options has benefits and drawbacks.

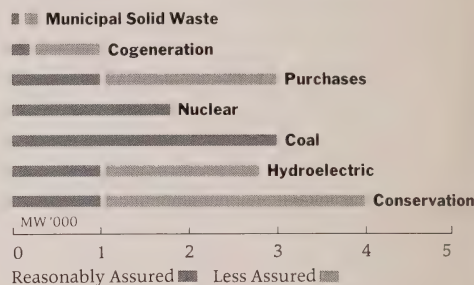
Ontario Hydro will continue to investigate all the options. We'll be judging each one on the basis of a number of factors including the costs of building them and keeping them running through the years, and their effect on our environment.

Our electricity system should reflect the values and attitudes of the people who rely on it. And that means finding out from our customers which options they think offer the most important benefits . . . or the most serious drawbacks.

Ontario Hydro exists to serve *all* the people of the Province. That's why we maintain a Speakers' Bureau program, conduct community Hydro Forums, and provide other opportunities for our customers to learn more about our business.

One of our best assets for future energy security is informed, knowledgeable customers.

### Potential Contribution to Power Requirements by Year 2000



Above: Ontario has many potential ways of generating electrical power. Studies are under way to find the best mix of options.

Right: Discussing with the residents of the Gull Bay community potential impacts of building a hydro-electric dam on the Little Jackfish River.







**Where Can I Find Out More?**

Hydro maintains dozens of local offices throughout Ontario. A good place to start is with the Community Relations Officer in one of our six Regional Offices or at Head Office in Toronto. They can provide information on many of our programs and their part in local communities.

**Head Office**

700 University Avenue  
Toronto, Ont.  
M5G 1X6  
(416) 592-3318

**Central Region**

5760 Yonge St.  
Willowdale, Ont.  
M2M 3T7  
(416) 222-2571

**Georgian Bay Region**

93 Bell Farm Road  
Barrie, Ont.  
L4M 1H1  
(705) 728-5521

**Northwestern Region**

34 Cumberland St. N. Rm 304  
Thunder Bay, Ont.  
P7A 4L5  
(807) 343-3411

**Eastern Region**

420 Dundas St. East  
Belleville, Ont.  
K8N 5C3  
(613) 966-6502

**Northeastern Region**

590 Graham Drive  
North Bay, Ont.  
P1B 8L4  
(705) 472-8000

**Western Region**

1075 Wellington Road  
London, Ont.  
N6E 1M1  
(519) 681-1390







